

Report of a...

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# Relative Accuracy Test Audit

QUALITY DIVISION

Performed for ...

Cleveland-Cliffs, Inc.  
Tilden Mining Company, L.C.  
Ishpeming, Michigan

On...

Unit 1

At the...

Tilden Mine  
National Mine, Michigan

July 25-26, 2023

Project #: 053.62

By...

Network Environmental, Inc.  
Grand Rapids, MI

performed for

Cleveland-Cliffs, Inc.  
Tilden Mining Company, L.C.  
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Performed at the:

Tilden Mine  
National Mine, MI

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## **I. INTRODUCTION**

Network Environmental, Inc. was retained by the Tilden Mining Company, L.C. of Ishpeming, Michigan to perform a relative accuracy test audit (RATA) at the Tilden Mine located in National Mine, Michigan.

The purpose of the testing was to conduct a Relative Accuracy Test Audit (RATA) on the Continuous Emission Monitoring System (CEMS) that services Unit 1. There are two (2) exhaust stacks (North & South) on Unit 1. Each exhaust stack has its own CEMS. The CEMS on Unit 1 is for Oxides of Nitrogen (NO<sub>x</sub>), Sulfur Dioxide (SO<sub>2</sub>), air flow rate, Oxygen (O<sub>2</sub>) and moisture.

The RATA's were performed over the period of July 25-26, 2023. Stephan K. Byrd, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. conducted the RATA's in accordance with Part 60 of Title 40 of the Code of Federal Regulations. The following reference test methods were employed to conduct the RATA sampling:

- Air Flow Rates – U.S. EPA Methods 1-2
- Oxygen & Carbon Dioxide (O<sub>2</sub> & CO<sub>2</sub>) – U.S. EPA Method 3A
- Moisture – U.S. EPA Method 4
- Sulfur Dioxide (SO<sub>2</sub>) – U.S. EPA Method 6C
- Oxides of Nitrogen (NO<sub>x</sub>) – U.S. EPA Method 7E

Assisting with the RATA's were Mr. Jason Sammon of CEMSOURCE and Mr. Dan McGrath of the Tilden Mine.

**II. PRESENTATION OF RESULTS**

**II.1 TABLE 1  
NO<sub>x</sub> (LBS/HR) RELATIVE ACCURACY DETERMINATION  
UNIT 1  
NORTH WASTE GAS STACK  
CLEVELAND CLIFFS, INC.  
TILDEN MINING COMPANY, L.C.  
NATIONAL MINE, MICHIGAN  
JULY 25, 2023**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		NO <sub>x</sub> <sup>(1)</sup>	DSCFM <sup>(2)</sup>	Lbs/Hr <sup>(3)</sup>	Lbs/Hr <sup>(3)</sup>	
1	10:37-11:02	154.5	254,338	280.69	270.10	10.59
2	11:19-11:44	181.7	248,619	322.73	317.70	5.03
3	12:04-12:29	149.3	247,789	264.20	263.40	0.80
4	12:50-13:15	149.8	251,267	268.83	264.80	4.03
5	13:29-13:53	169.6	250,527	303.44	292.90	10.54
6	14:08-14:32	188.1	253,386	340.46	325.70	14.76
7	14:49-15:14	174.8	253,102	316.04	303.00	13.04
8	15:29-15:54	158.3	252,662	285.67	272.50	13.17
9	16:07-16:32	160.1	254,131	290.59	276.90	13.69

Mean Reference Value = 296.9611

Absolute Value of the Mean of the Differences = 9.5167

Standard Deviation = 4.9885

Confidence Co-efficient = 3.8345

**Relative Accuracy = 4.50% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

- (1) Concentration in terms of PPM by volume on a dry basis
- (2) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)
- (3) Lbs/Hr = Pounds Per Hour

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**II.2 TABLE 2**  
**SO<sub>2</sub> (LBS/HR) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**NORTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 25, 2023**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		SO <sub>2</sub> <sup>(1)</sup>	DSCFM <sup>(2)</sup>	Lbs/Hr <sup>(3)</sup>	Lbs/Hr <sup>(3)</sup>	
1	10:37-11:02	20.0	254,338	50.60	48.1	2.50
2	11:19-11:44	14.1	248,619	34.94	37.3	-2.36
3	12:04-12:29	17.8	247,789	43.72	43.3	0.42
4	12:50-13:15	19.0	251,267	47.57	46.8	0.77
5	13:29-13:53	18.3	250,527	45.52	45.2	0.32
6	14:08-14:32	20.0	253,386	50.41	49.3	1.11
7	14:49-15:14	18.5	253,102	46.57	46.4	0.17
8	15:29-15:54	18.2	252,662	45.79	45.0	0.79
9	16:07-16:32	16.2	254,131	40.92	39.8	1.12

Mean Reference Value = 45.1156

Absolute Value of the Mean of the Differences = 0.5378

Standard Deviation = 1.2859

Confidence Co-efficient = 0.9884

**Relative Accuracy = 3.38% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

(2) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)

(3) Lbs/Hr = Pounds Per Hour

**II.3 TABLE 3  
 NO<sub>x</sub> (PPM) RELATIVE ACCURACY DETERMINATION  
 UNIT 1  
 NORTH WASTE GAS STACK  
 CLEVELAND CLIFFS, INC.  
 TILDEN MINING COMPANY, L.C.  
 NATIONAL MINE, MICHIGAN  
 JULY 25, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		NO <sub>x</sub> <sup>(1)</sup>	NO <sub>x</sub> <sup>(1)</sup>	
1	10:37-11:02	154.5	158.2	-3.7
2	11:19-11:44	181.7	184.0	-2.3
3	12:04-12:29	149.3	155.0	-5.7
4	12:50-13:15	149.8	155.8	-6.0
5	13:29-13:53	169.6	174.1	-4.5
6	14:08-14:32	188.1	194.6	-6.5
7	14:49-15:14	174.8	179.7	-4.9
8	15:29-15:54	158.3	161.7	-3.4
9	16:07-16:32	160.1	166.2	-6.1

Mean Reference Value = 165.1333

Absolute Value of the Mean of the Differences = 4.7889

Standard Deviation = 1.4295

Confidence Co-efficient = 1.0988

**Relative Accuracy = 3.57% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

**II.4 TABLE 4**  
**SO<sub>2</sub> (PPM) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**NORTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 25, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		SO <sub>2</sub> <sup>(1)</sup>	SO <sub>2</sub> <sup>(1)</sup>	
1	10:37-11:02	20.0	20.3	-0.3
2	11:19-11:44	14.1	15.5	-1.4
3	12:04-12:29	17.8	18.3	-0.5
4	12:50-13:15	19.0	19.8	-0.8
5	13:29-13:53	18.3	19.3	-1.0
6	14:08-14:32	20.0	21.2	-1.2
7	14:49-15:14	18.5	19.8	-1.3
8	15:29-15:54	18.2	19.2	-1.0
9	16:07-16:32	16.2	17.2	-1.0

Mean Reference Value = 18.0111

Absolute Value of the Mean of the Differences = 0.9444

Standard Deviation = 0.3609

Confidence Co-efficient = 0.2774

**Relative Accuracy = 6.78% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

**II.5 TABLE 5**  
**O<sub>2</sub> (%) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**NORTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 25, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		O <sub>2</sub> <sup>(1)</sup>	O <sub>2</sub> <sup>(1)</sup>	
1	10:37-11:02	18.6	18.8	-0.2
2	11:19-11:44	18.7	19.0	-0.3
3	12:04-12:29	18.6	18.8	-0.2
4	12:50-13:15	18.5	18.8	-0.3
5	13:29-13:53	18.7	18.8	-0.1
6	14:08-14:32	18.7	18.7	0.0
7	14:49-15:14	18.7	18.8	-0.1
8	15:29-15:54	18.5	18.8	-0.3
9	16:07-16:32	18.6	18.8	-0.2

Mean Reference Value = 18.6222

Absolute Value of the Mean of the Differences = 0.1889

Standard Deviation = 0.1054

Confidence Co-efficient = 0.0810

**Relative Accuracy = 1.45% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of % by volume on a dry basis

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**II.6 TABLE 6**  
**AIR FLOW (KSCFH) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**NORTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 25, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		KSCFH <sup>(1)</sup>	KSCFH <sup>(1)</sup>	
1	10:37-11:02	16,707	15,826	881
2	11:19-11:44	16,578	15,930	648
3	12:04-12:29	16,508	15,718	790
4	12:50-13:15	16,777	15,788	989
5	13:29-13:53	16,886	15,728	1,158
6	14:08-14:32	17,098	15,787	1,311
7	14:49-15:14	17,144	15,941	1,203
8	15:29-15:54	17,074	15,795	1,279
9	16:07-16:32	17,136	15,647	1,489

Mean Reference Value = 16,878.67

Absolute Value of the Mean of the Differences = 1,083.11

Standard Deviation = 273.86

Confidence Co-efficient = 210.50

**Relative Accuracy = 7.66% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Thousand Standard Cubic Feet Per Hour

**II.7 TABLE 7  
 MOISTURE (%) RELATIVE ACCURACY DETERMINATION  
 UNIT 1  
 NORTH WASTE GAS STACK  
 CLEVELAND CLIFFS, INC.  
 TILDEN MINING COMPANY, L.C.  
 NATIONAL MINE, MICHIGAN  
 JULY 25, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		Moisture <sup>(1)</sup>	Moisture <sup>(1)</sup>	
1	10:37-11:02	8.66	9.6	-0.94
2	11:19-11:44	10.02	9.2	0.82
3	12:04-12:29	9.94	9.4	0.54
4	12:50-13:15	10.14	9.8	0.34
5	13:29-13:53	10.98	10.4	0.58
6	14:08-14:32	11.08	11.1	-0.02
7	14:49-15:14	11.42	11.4	0.02
8	15:29-15:54	11.21	10.6	0.61
9	16:07-16:32	11.02	10.9	0.12

Mean Reference Value = 10.4967

Absolute Value of the Mean of the Differences = 0.2300

Standard Deviation = 0.5257

Confidence Co-efficient = 0.4041

**Relative Accuracy = 6.04% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of % by volume on a dry basis

**II.8 TABLE 8**  
**NO<sub>x</sub> (LBS/HR) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**SOUTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 26, 2023**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		NO <sub>x</sub> <sup>(1)</sup>	DSCFM <sup>(2)</sup>	Lbs/Hr <sup>(3)</sup>	Lbs/Hr <sup>(3)</sup>	
1	16:56-17:21	269.2	456,908	878.70	969.90	-91.20
2	17:38-18:03	274.7	447,633	878.46	937.60	-59.14
3	18:18-18:43	272.3	450,688	876.72	914.50	-37.78
4	18:57-19:22	263.9	449,721	847.75	886.30	-38.55
5	19:36-20:01	278.6	442,253	880.20	977.60	-97.40
6	20:24-20:49	271.9	423,323	822.36	982.30	-159.94
7	21:04-21:29	261.7	444,924	831.77	916.70	-84.93
8	21:44-22:09	243.0	446,418	774.99	844.80	-69.81
9	22:25-22:50	276.2	446,168	880.24	941.70	-61.46

Mean Reference Value = 852.3544

Absolute Value of the Mean of the Differences = 77.8011

Standard Deviation = 37.3877

Confidence Co-efficient = 28.7387

**Relative Accuracy = 12.50% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

(2) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)

(3) Lbs/Hr = Pounds Per Hour

**II.9 TABLE 9**  
**SO<sub>2</sub> (LBS/HR) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**SOUTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 26, 2023**

Run #	Time	REFERENCE METHOD			CEM	DIFF
		SO <sub>2</sub> <sup>(1)</sup>	DSCFM <sup>(2)</sup>	Lbs/Hr <sup>(3)</sup>	Lbs/Hr <sup>(3)</sup>	
1	16:56-17:21	16.3	456,908	74.05	77.6	-3.55
2	17:38-18:03	19.2	447,633	85.60	87.3	-1.70
3	18:18-18:43	22.1	450,688	98.92	93.9	5.02
4	18:57-19:22	20.1	449,721	89.85	86.0	3.85
5	19:36-20:01	22.2	442,253	97.49	99.2	-1.71
6	20:24-20:49	20.6	423,323	86.72	94.9	-8.18
7	21:04-21:29	20.1	444,924	89.07	91.3	-2.23
8	21:44-22:09	13.1	446,418	58.04	57.0	1.04
9	22:25-22:50	19.2	446,168	85.27	81.2	4.07

Mean Reference Value = 85.0011

Absolute Value of the Mean of the Differences = 0.3767

Standard Deviation = 4.2821

Confidence Co-efficient = 3.2915

**Relative Accuracy = 4.32% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

(2) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)

(3) Lbs/Hr = Pounds Per Hour

**II.10 TABLE 10  
NO<sub>x</sub> (PPM) RELATIVE ACCURACY DETERMINATION  
UNIT 1  
SOUTH WASTE GAS STACK  
CLEVELAND CLIFFS, INC.  
TILDEN MINING COMPANY, L.C.  
NATIONAL MINE, MICHIGAN  
JULY 26, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		NO <sub>x</sub> <sup>(1)</sup>	NO <sub>x</sub> <sup>(1)</sup>	
1	16:56-17:21	269.2	295.7	-26.5
2	17:38-18:03	274.7	297.8	-23.1
3	18:18-18:43	272.3	295.3	-23.0
4	18:57-19:22	263.9	287.2	-23.3
5	19:36-20:01	278.6	304.3	-25.7
6	20:24-20:49	271.9	301.3	-29.4
7	21:04-21:29	261.7	288.2	-26.5
8	21:44-22:09	243.0	269.4	-26.4
9	22:25-22:50	276.2	305.6	-29.4

Mean Reference Value = 267.9444

Absolute Value of the Mean of the Differences = 25.9222

Standard Deviation = 2.4626

Confidence Co-efficient = 1.8929

**Relative Accuracy = 10.38% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

**II.11 TABLE 11**  
**SO<sub>2</sub> (PPM) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**SOUTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 26, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		SO <sub>2</sub> <sup>(1)</sup>	SO <sub>2</sub> <sup>(1)</sup>	
1	16:56-17:21	16.3	17.0	-0.7
2	17:38-18:03	19.2	19.9	-0.7
3	18:18-18:43	22.1	21.8	0.3
4	18:57-19:22	20.1	20.0	0.1
5	19:36-20:01	22.2	22.2	0.0
6	20:24-20:49	20.6	20.9	-0.3
7	21:04-21:29	20.1	20.6	-0.5
8	21:44-22:09	13.1	13.1	0.0
9	22:25-22:50	19.2	18.9	0.3

Mean Reference Value = 19.2111

Absolute Value of the Mean of the Differences = 0.1667

Standard Deviation = 0.3969

Confidence Co-efficient = 0.3051

**Relative Accuracy = 2.46% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of PPM by volume on a dry basis

**II.12 TABLE 12**  
**O<sub>2</sub> (%) RELATIVE ACCURACY DETERMINATION**  
**UNIT 1**  
**SOUTH WASTE GAS STACK**  
**CLEVELAND CLIFFS, INC.**  
**TILDEN MINING COMPANY, L.C.**  
**NATIONAL MINE, MICHIGAN**  
**JULY 26, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		O <sub>2</sub> <sup>(1)</sup>	O <sub>2</sub> <sup>(1)</sup>	
1	16:56-17:21	17.1	16.7	0.4
2	17:38-18:03	17.0	16.7	0.3
3	18:18-18:43	17.1	16.7	0.4
4	18:57-19:22	17.1	16.7	0.4
5	19:36-20:01	17.1	16.7	0.4
6	20:24-20:49	17.1	16.7	0.4
7	21:04-21:29	17.2	16.8	0.4
8	21:44-22:09	17.5	17.0	0.5
9	22:25-22:50	17.1	16.6	0.5

Mean Reference Value = 17.1444

Absolute Value of the Mean of the Differences = 0.4111

Standard Deviation = 0.0601

Confidence Co-efficient = 0.0462

**Relative Accuracy = 2.67% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of % by volume on a dry basis

**II.13 TABLE 13  
AIR FLOW (KSCFH) RELATIVE ACCURACY DETERMINATION  
UNIT 1  
SOUTH WASTE GAS STACK  
CLEVELAND CLIFFS, INC.  
TILDEN MINING COMPANY, L.C.  
NATIONAL MINE, MICHIGAN  
JULY 26, 2023**

Run #	Time	REFERENCE METHOD	GEM	DIFF
		KSCFH <sup>(1)</sup>	KSCFH <sup>(1)</sup>	
1	16:56-17:21	31,689	31,666	23
2	17:38-18:03	31,387	30,488	899
3	18:18-18:43	31,447	30,104	1,343
4	18:57-19:22	31,274	29,962	1,312
5	19:36-20:01	30,755	31,167	-412
6	20:24-20:49	29,323	31,626	-2,303
7	21:04-21:29	31,052	30,956	96
8	21:44-22:09	31,160	30,632	528
9	22:25-22:50	31,070	29,944	1,126

Mean Reference Value = 31,017.44

Absolute Value of the Mean of the Differences = 290.22

Standard Deviation = 1,151.36

Confidence Co-efficient = 885.01

**Relative Accuracy = 3.79% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Thousand Standard Cubic Feet Per Hour

**II.14 TABLE 14  
 MOISTURE (%) RELATIVE ACCURACY DETERMINATION  
 UNIT 1  
 SOUTH WASTE GAS STACK  
 CLEVELAND CLIFFS, INC.  
 TILDEN MINING COMPANY, L.C.  
 NATIONAL MINE, MICHIGAN  
 JULY 26, 2023**

Run #	Time	REFERENCE METHOD	CEM	DIFF
		Moisture <sup>(1)</sup>	Moisture <sup>(1)</sup>	
1	16:56-17:21	13.49	13.3	0.19
2	17:38-18:03	14.43	13.5	0.93
3	18:18-18:43	14.01	13.9	0.11
4	18:57-19:22	13.72	13.7	0.02
5	19:36-20:01	13.72	13.6	0.12
6	20:24-20:49	13.38	13.7	-0.32
7	21:04-21:29	14.03	14.0	0.03
8	21:44-22:09	14.04	14.2	-0.16
9	22:25-22:50	13.84	13.8	0.04

Mean Reference Value = 13.8511

Absolute Value of the Mean of the Differences = 0.1067

Standard Deviation = 0.3457

Confidence Co-efficient = 0.2657

**Relative Accuracy = 2.69% of the mean of the reference method**

Relative Accuracy Needs To Be Less Than 20% Of Reference Method

(1) Concentration in terms of % by volume on a dry basis

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### **III. DISCUSSION OF RESULTS**

The results of the RATA's are presented in Tables 1 through 14 (Section II.1 through II.14) as follows:

#### **North**

- Table 1 – NO<sub>x</sub> Lbs/Hr
- Table 2 – SO<sub>2</sub> Lbs/Hr
- Table 3 – NO<sub>x</sub> PPM
- Table 4 – SO<sub>2</sub> PPM
- Table 5 – O<sub>2</sub> %
- Table 6 – Air Flow
- Table 7 – Moisture

#### **South**

- Table 8 – NO<sub>x</sub> Lbs/Hr
- Table 9 – SO<sub>2</sub> Lbs/Hr
- Table 10 – NO<sub>x</sub> PPM
- Table 11 – SO<sub>2</sub> PPM
- Table 12 – O<sub>2</sub> %
- Table 13 – Air Flow
- Table 14 – Moisture

The results of the RATA's are summarized as follows:

Source	Parameter	EPA Performance Specification	Actual Performance	RATA Frequency
Unit 1 North	NO <sub>x</sub> – Lbs/Hr	≤20% of RM	4.50% of RM	Annual
	SO <sub>2</sub> – Lbs/Hr	≤20% of RM	3.38% of RM	Annual
	NO <sub>x</sub> – PPM	≤20% of RM	3.57% of RM	Annual
	SO <sub>2</sub> – PPM	≤20% of RM	6.78% of RM	Annual
	O <sub>2</sub> – %	≤20% of RM or ±1.0% Diff	1.45% RM 0.19 Avg. Diff	Annual
	Air Flow – KSCFH	≤20% of RM	7.66% of RM	Annual
	Moisture – %	≤20% of RM	6.04% of RM	Annual

Source	Parameter	EPA Performance Specification	Actual Performance	RATA Frequency
Unit 1 South	NO <sub>x</sub> – Lbs/Hr	≤20% of RM	12.50% of RM	Annual
	SO <sub>2</sub> – Lbs/Hr	≤20% of RM	4.32% of RM	Annual
	NO <sub>x</sub> – PPM	≤20% of RM	10.38% of RM	Annual
	SO <sub>2</sub> – PPM	≤20% of RM	2.46% of RM	Annual
	O <sub>2</sub> – %	≤20% of RM or ±1.0% Diff	2.67% RM 0.41 Avg. Diff	Annual
	Air Flow – KSCFH	≤20% of RM	3.79% of RM	Annual
	Moisture – %	≤20% of RM	2.69% of RM	Annual

#### **IV. CEMS SPECIFICATIONS**

Location	Parameter	Manufacturer / Model #	Serial #
Unit 1 North	NO <sub>x</sub> / O <sub>2</sub>	Teledyne Monitor Labs / T200H/O <sub>2</sub>	148
	SO <sub>2</sub>	Teledyne Monitor Labs / T100H	146
	Air Flow	Teledyne Monitor Labs / UF150	1501325
Location	Parameter	Manufacturer / Model #	Serial #
Unit 1 South	NO <sub>x</sub> / O <sub>2</sub>	Teledyne Monitor Labs / T200H/O <sub>2</sub>	149
	SO <sub>2</sub>	Teledyne Monitor Labs / T100H	147
	Air Flow	Teledyne Monitor Labs / UF150	1501324

## **V. SAMPLING AND ANALYTICAL PROTOCOL**

The RATA's were performed in accordance with 40 CFR Part 60. Sampling was performed on the 161" ID North stack and the 233" ID South stack. Twenty-Four (24) point traverses were used on all stacks for the air flow determinations. The actual sampling point dimensions for the velocity traverses can be found in Appendix F.

The sampling methods used for the reference method determinations were as follows:

**V.1 Oxides of Nitrogen** – The NO<sub>x</sub> sampling was conducted in accordance with U.S. EPA Reference Method 7E. A Thermo Environmental Model 42H gas analyzer was used to monitor the exhaust stacks. A heated Teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the NO<sub>x</sub> concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 484.0 PPM was used to establish the initial instrument calibration. Calibration gases of 251.0 PPM and 127.0 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected, using the 251.0 PPM gas to determine the system bias. After each sample, a system zero and system injection of 251.0 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified. A 50.9 PPM NO<sub>2</sub> gas was used to determine conversion efficiency for the analyzer. The conversion efficiency was 94.30%.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the unit. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

**V.2 Sulfur Dioxide** – The SO<sub>2</sub> sampling was conducted in accordance with U.S. EPA Reference Method 6C. A Bovar Model 721M gas analyzer was used to monitor the exhausts. Sample gas was extracted through a heated probe. A heated teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the SO<sub>2</sub> concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 95.2 PPM was used to establish the initial instrument calibration. A calibration gas of 50.2 PPM was used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 50.2 PPM gas to determine the system bias. After each sample, a system zero and system injection of 50.2 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the unit. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

**V.3 Oxygen** – The O<sub>2</sub> sampling was conducted in accordance with U.S. EPA Reference Method 3A. A heated Teflon sample line was used to transport the exhaust gases from the exhaust stacks to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner the stack gases were passed to a Servomex Series 1400 O<sub>2</sub> analyzer. This analyzer produces instantaneous readouts of the oxygen concentrations (%).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 21.0% was used to establish the initial instrument calibration. Calibration gases of 6.03% and 12.0% were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using either the 6.03% or the 12.0% gas to determine the system bias. After each sample, a system zero and system injection of either 6.03% or 12.0% were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

**V.4 Carbon Dioxide** - The CO<sub>2</sub> sampling was conducted in accordance with U.S. EPA Reference Method 3A. A heated Teflon sample line was used to transport the exhaust gases from the exhaust stacks to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner the stack gases were passed to a Servomex Series 1400 CO<sub>2</sub> analyzer. This analyzer produces instantaneous readouts of the carbon dioxide concentrations (%).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 21.1% was used to establish the initial instrument calibration. Calibration gases of 5.95% and 11.9% were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using either the 5.95% or the 11.9% gas to determine the system bias. After each sample, a system zero and system injection of either 5.95% or 11.9% were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

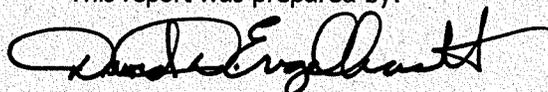
The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A schematic diagram of the sampling train is shown in Figure 1.

**V.5 Moisture** - Moisture samples were collected in accordance with U.S. EPA Method 4. Samples were withdrawn from the stack and passed through a condensing coil with drop out before being passed through pre-weighed silica gel. The water collected was measured to the nearest 0.5 g and the silica gel was re-weighed to the nearest 0.5 g. The moisture collected along with the sample volume was used to determine the percent moisture in the exhaust. Each sample was twenty five (25) minutes in duration and had a minimum sample volume of twenty-one (21) standard cubic feet. A diagram of the moisture sampling train is shown in Figure 2.

**V.6 Air Flows** - The air flow rates were determined in conjunction with the other sampling by employing U.S. EPA Reference Methods 1 and 2. Sampling was performed on the 161" ID North stack and the 233" ID South stack. Twenty-Four (24) point traverses were used on all the stacks. The actual sampling point dimensions for the velocity traverses can be found in Appendix F.

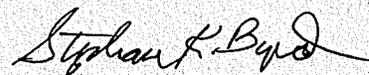
Velocity pressures were determined using an S-Type pitot tube. Temperatures were measured using a Type K thermocouple. A diagram of the air flow sampling train is shown in Figure 3.

This report was prepared by:

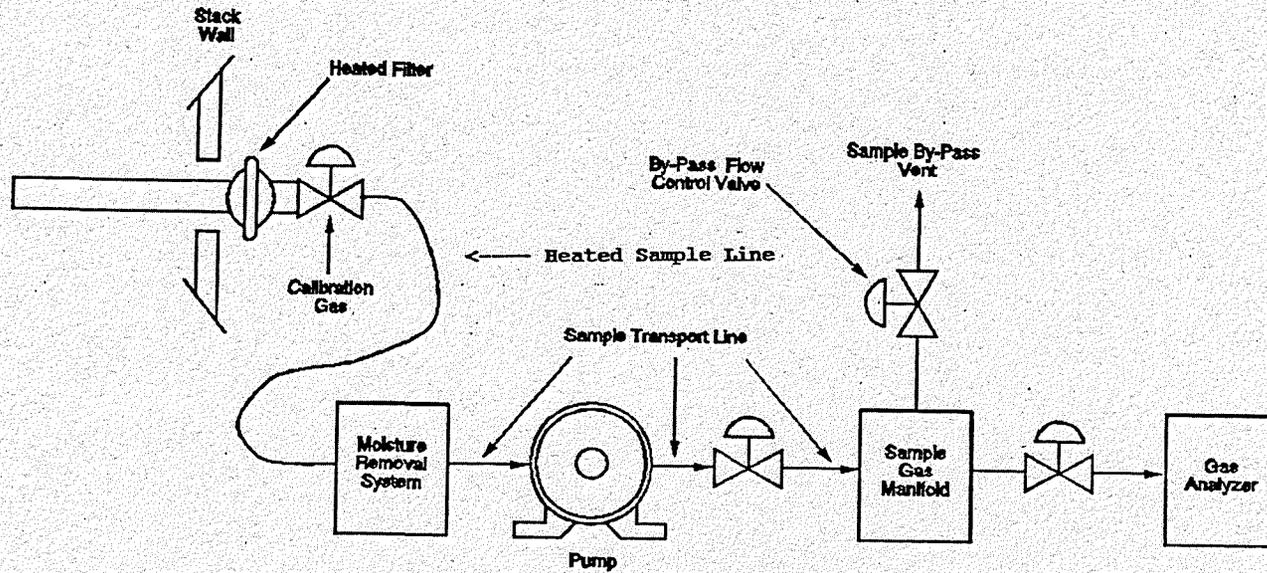


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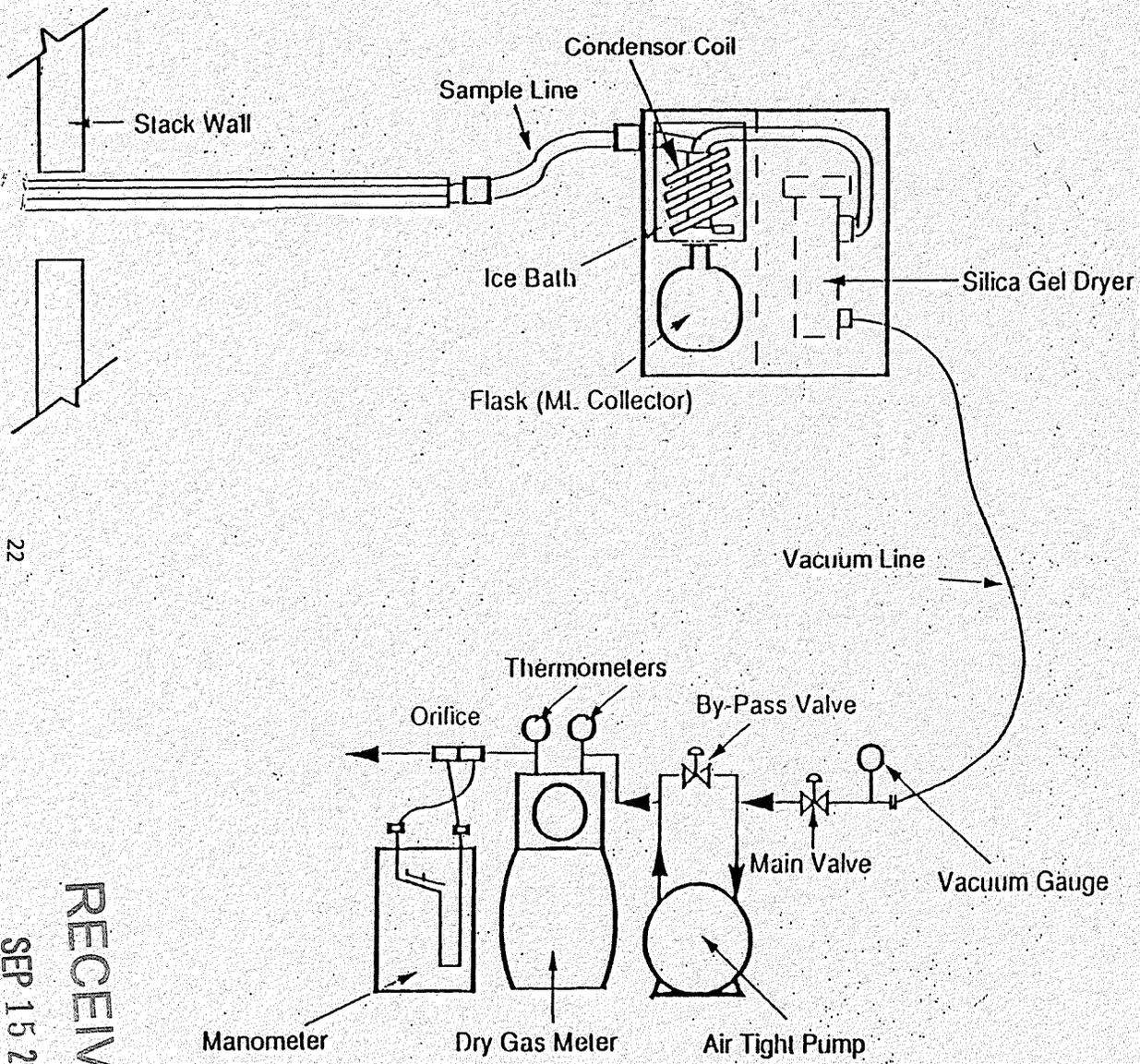
This report was reviewed by:



Stephan K. Byrd  
President

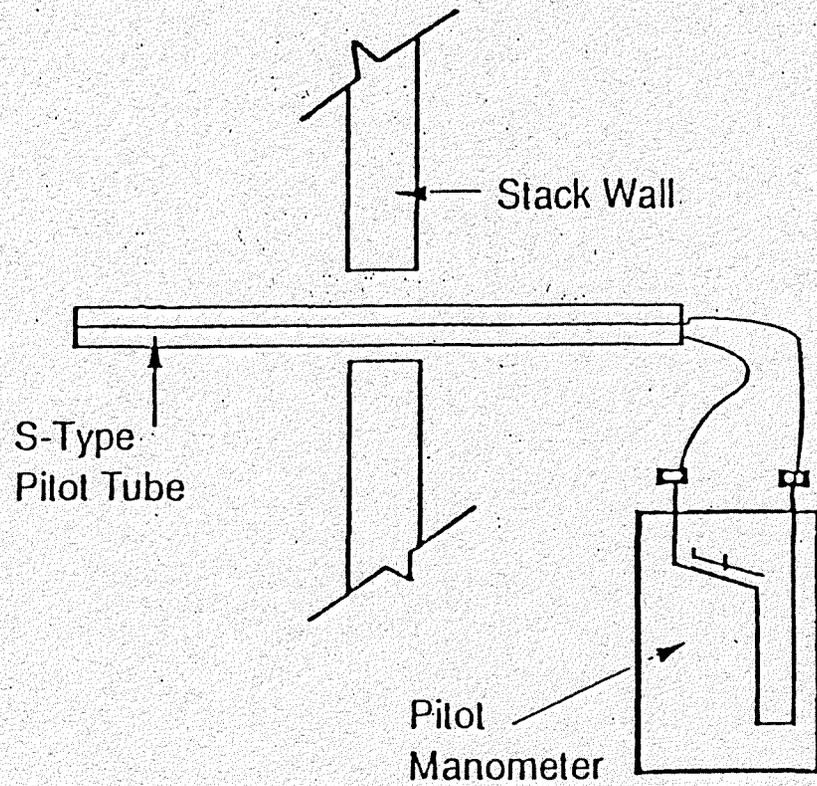


**Figure 1**  
**NO<sub>x</sub>, SO<sub>2</sub>, O<sub>2</sub> & CO<sub>2</sub>**  
**Sampling Train**



**Figure 2**  
**Moisture**  
**Sampling Train**

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**Figure 3**  
**Air Flow**  
**Sampling Train**